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Letter to the Editor

How artificial intelligence and internet of things can aid in the distribution of COVID-19 vaccines



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Dear Editor

Prior to the COVID-19 pandemic, challenges related to our aging populations and a shortage of healthcare professionals had already accelerated the deployment of artificial intelligence (AI) in healthcare. This trend has been hastened by the pandemic. Real-time contact tracing applications are only one of the many AI applications being used to control the virus's spread and bolster the public health response [1]. Since the beginning of the COVID-19 crisis, artificial intelligence and the internet of things (IoT) have played an important role, convincing that they can be very useful tools in dealing with this type of crisis. As the world begins to be vaccinated against COVID-19, some important logistics and access questions arise. Indeed, in a country like India, where there are more than 1.3 billion people and limited resources, distributing the COVID-19 vaccine to the people can be a difficult task. Although the Indian government has approved two COVID-19 vaccines (Oxford-AstraZeneca's Covishield and Bharat Biotech's Covaxin), the challenge of administering the two-dose vaccine to everyone will be a massive task.

In the first phase of India's vaccination campaign, priority was given to all healthcare and frontline workers. The second phase, which began on March 1, 2021, involves giving doses to people over the age of 60 and those between the ages of 45 and 59 who have specific comorbidities. From April 1, 2021, everyone over the age of 45, regardless of comorbidity status, is eligible for vaccination in the third phase [2].

The majority of COVID-19 vaccines necessitate temperature-controlled storage. For example, Oxford-AstraZeneca's Covishield and Bharat Biotech's Covaxin require a storage temperature of 2–8 °C. Sensor-based IoT technology, which enables continuous monitoring of data in real-time, can be useful in ensuring an effective storage system. In the event of a temperature change, the sensors will read it and give a device warning for the next shipment of vaccines. Furthermore, the whole process requires a large amount of data that must be handled and maintained in a Cloud that is

open to all stakeholders. The big issue is also monitoring real-time details about the vaccine supply chain in remote areas of a country. The government can minimize this problem by using location-based analytics, which can assist in any form of vaccine supply chain problems. The Indian government has launched a startup challenge to improve the intelligence platform through innovative technology solutions to resolve the problems [3]. There are four main paths for AI and IoT activities related to the supply chain and access to medicine [4]:

Demand forecasting: Choosing where and when to ship doses to vaccinate as many people as possible in as little time as possible.

Modeling of impact and triage: Determining which population groups should be vaccinated in which order to bring the pandemic to an end as soon as possible.

Supply chain management: Keeping an eye out for obstacles in the vaccine production and distribution networks.

Surveillance after vaccination: Keeping an eye out for any signs of adverse side effects from the vaccine that was not discovered during clinical trials.

The Co-WIN (COVID Vaccine Intelligence Network) program has also been launched as a result of the acceptance of the two vaccines. The framework was created in cooperation with the United Nations Development Programme (UNDP) and is an updated version of eVIN (Electronic Vaccine Intelligence Network) [5].

Co-WIN

In 2015, India's National Health Mission launched the eVIN platform, intending to vaccinate 27 million women and 29 million children each year. eVIN was launched in 12 Indian states to support the logistics management of vaccines of the United Nations Universal Immunization Program. Through a smartphone application, the platform digitized the vaccine stock and monitored the temperature of the cold chain. Co-WIN is a cloud-based solution for planning, implementing, monitoring, and evaluating the COVID-19 vaccine in India [6]. It is an extension of eVIN. Experts agree that the updated platform should be scaled up to take advantage of the potential of emerging technologies including AI, the IoT, and machine learning to assist with the daunting task of vaccine administration. The largest registration and vaccination drive is going on and beneficiaries receive SMS notifications about their vaccination centre and date.

The current intelligence network's limitations have been highlighted by health experts and stakeholders from the broader healthcare industry. They also stated that, in addition to registration, Co-Win must allow tracking of vaccines during transit, supply chain and inventory management, data storage, and training of

centre, state, and district officials for an effective immunization program. This is only possible through the use of technologies such as AI and IoT.

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There are no conflicts to declare.

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